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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/723,810

11/26/2003

Thomas Evans

138963-1

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7590

09/25/2007

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EXAMINER

GAKH, YELENA G

ART UNIT

PAPER NUMBER

1743

MAIL DATE

DELIVERY MODE

09/25/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/723,810

Applicant(s)

EVANS ET AL.

Examiner

Yelena G. Gakh, Ph.D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 9, 10, 21, 23 and 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-20, 22 and 25-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____  |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :11/26/03, 11/09/04, 7/19/05, 10/13/05, 12/14/05, 03/22/06, 09/22/06, 05/07/07.

### DETAILED ACTION

1. Election of species and amendment filed on 07/16/07 are acknowledged. Claims 1-39 are pending in the application. Regarding Applicants' remarks that the DMBPC species reads on claims 23-31, the examiner respectfully disagrees, since claims 23 and 24 obviously recite different species from DMBPC, and there is no indication whatsoever that DMBPC can be a part of the polymer recited in claims 23 and 24. Therefore, claims 9-10, 21, 23-24 are withdrawn from consideration. Claims 1-8, 11-20, 22 and 25-39 are considered on merits.

#### *Drawings*

2. Figure 2 is objected to as being of a poor quality. The Applicants are advised to resubmit the drawing with the spectrum comprising clear signals and captions.

#### *Claim Objections*

3. Claim 17 is objected to because of the following informalities: it should recite "(-CH<sub>2</sub>-)<sub>n</sub>" instead of "-(CH<sub>2</sub>)-n". Appropriate correction is required.

#### *Specification*

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

A. The specification is objected to as not written in such full, clear, concise and exact terms as required by the first paragraph of 35 U.S.C. 112. In particular, such terms as "a forensic authentication marker", "a dynamic response authentication marker", as well as "forensic analytical technique" and "dynamic response analytical technique", which are essential for understanding and performing the claimed method, are not defined clearly and unambiguously in the specification. For example, "forensic authentication markers" are defined as "one or more organic or inorganic functional groups or structures that are not originally present in the chemical structure of the substrate polymer". This is a conventional definition for all markers, since all markers, tags or labels are the groups or materials that are not a part of the original material. It is not clear, how this definition is different from a definition given for "a dynamic response authentication marker": "dynamic response authentication marker as used herein refers to spectroscopic tags,

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thermochromic compounds and optically variable tags”. First of all, it is not clear, what the “spectroscopic tags” might be? All functional groups are detectable by one or another spectroscopic method. Does it mean that any group can be a “spectroscopic tag”? Furthermore, all listed tags, i.e. “spectroscopic tags, thermochromic compounds and optically variable tags” are not present in the original compounds, and therefore may be considered “forensic authentication markers”, according to the definition of these markers.

The same ambiguity and unclarity is found for definitions of “forensic analytical technique” and “dynamic response analytical technique”. The examiner provides complete paragraph [0063] defining “forensic analytical technique”: “[0063] Forensic analytical techniques as used herein refer to analytical methods that generally require significant expenditures with respect to equipment and/or preparation and are capable of detecting a forensic authentication marker in the amounts used here such that they produce a signal or response that confirms the presence of the forensic authentication marker in the tagged polymer. Illustrative examples include resonance spectroscopy methods such as nuclear magnetic resonance (NMR) and electron spin resonance (ESR), x-ray photon electron spectroscopy- electron spectroscopy for chemical analysis (XPS-ESCA), energy dispersive x-ray spectroscopy (EDX) coupled to scanning electron microscopy (SEM- EDX), atomic absorption, and the like. Methods such as NIR, MIR, FTIR, x-ray irradiation, mass spectroscopy, and neutron spectroscopy are not within the scope of forensic analytical techniques”. The examiner does not quite understand a distinction that the Applicants provide for the techniques that are considered “forensic analytical techniques”, and those, which are not considered as such. For example, NMR cannot be considered a very sensitive method, and in order for the “forensic authentication marker”, which is just a functional group, to be revealed with the background of the NMR spectrum of the original polymer, such label should be present in the same amount as the polymer itself. Also, it is not apparent as to why such complex and involved techniques as mass spectrometry or X-ray analysis, or neutron spectroscopy, which also “require significant expenditures with respect to equipment and/or preparation”, are not included in the set of “forensic analytical techniques”? The

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distinction between the analytical techniques, which are considered to be “forensic analytical techniques” and those, which are not considered as such, is unclear and indefinite. Furthermore, it appears the forensic analytical techniques are contrasted with the optical spectroscopy, which however, is never named in the specification. However, if “dynamic response analytical technique” is optical spectroscopy, then it is not apparent, which one of these two groups X-ray analysis, mass spectrometry, neutron spectroscopy, etc. belong to?

All fluorophores, which are considered “dynamic response authentication markers” will give significant and definite signals in NMR spectra. Then why cannot they be considered “forensic authentication markers”?

B. The full chemical name for DMBPC (dimethyl bisphenol cyclohexane) should be given upon the first mentioning of this compound, rather than at the end of the specification in Example 1. Correction is required.

C. In paragraph [0097] the specification discloses: “n another embodiment, the optically variable tag will be present in the tagged polymer in an amount of less than or equal to about  $10^{-18}$  % by weight, based on the total weight of the tagged polymer. In one exemplary embodiment, the optically variable tag will be present in the tagged polymer in an amount of less than or equal to about  $10^{-12}$  % by weight, based on the total weight of the tagged polymer. In yet another exemplary embodiment, the optically variable tag will be present in the tagged polymer in an amount of less than or equal to about  $10^{-6}$  % by weight, based on the total weight of the tagged polymer. In one embodiment, the optically variable tag will be present in the tagged polymer in an amount of at least 0.0001% by weight, based on the total weight of the tagged polymer. In another embodiment, the optically variable tag will be present in a tagged polymer or article, such as an optical storage disk, at a loading between 0.0001% and 0.05% by weight, based on the weight of the tagged polymer”. The examiner did not find the promised examples for loadings of the tag of  $10^{-4}$  wt.%, not mentioning  $10^{-6}$  wt.%,  $10^{-12}$  wt.%, or  $10^{-18}$  wt.%. The examiner respectfully requests the Applicants to provide any evidence for detection sensitivity of any optical technique in the indicated ranges. It appears that the Applicants suggest measuring femtograms of the taggant in kilogram of the polymer.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 15 and 34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not disclose any “forensic analytical methods”, which allow detecting the forensic authentication marker in less than 0.005 wt.% of the total weight of the polymer. For example, the accuracy of integral errors for NMR spectra are 10-15%, and therefore it is not apparent, as to how the forensic authentication tags can be detected in the amount of less than 0.005% from the total weight of the polymer. The specification does not provide enablement for claim 34, since the only examples for “forensic analytical technique” are related to NMR spectroscopy, which is not able to detect less than 1% of the compound in a mixture relative to the total amount of the polymer.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-8, 11-20, 22 and 25-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims recite the subject matter, which is not clearly and definitely disclosed in the specification, including such essential definitions as “a forensic authentication marker”, “a dynamic response authentication marker”, “forensic analytical technique” and “dynamic response analytical technique”. Since these two types of markers and corresponding analytical techniques are not clearly defined in the specification and are not definitely discerned from each other, the examiner considers any two analytical techniques, including optical techniques using different wavelength ranges,

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corresponding these definitions. Moreover, since forensic authenticating marker and dynamic response authentication marker can be just functional groups and thus can belong the same compound, the examiner considers one compound, which can be detected by two optical techniques, meeting the description of two markers.

Claim 2 is not clear. How can authentication marker affect the optical property of the substrate material? By having an overlapping signal with that of the substrate material? The claim is not clear. The same is true for claims 3-6.

In claim 7 it is not quite apparent, which resonance spectroscopy methods are meant in the claim. The examiner considers all methods based on resonance meeting the description of the "resonance spectroscopic method", including Raman resonance spectroscopy.

Claims 11-15 recite specific content of the forensic authentication marker in wt.% relative to the tagged polymer. Since in dependent claims 16-17 the forensic authentication marker is recited as functional group, it is not clear, as to how such weight percentage is obtained.

Regarding claim 16, the examiner wonders, how is it possible to have a forensic authentication marker, which is an alkyl group of 2 or more carbon atoms, that is not present in the polymer? To the examiner's knowledge, all organic polymers comprise alkyl groups with at least two carbon atoms.

The definition of the "forensic authentications marked" provided in claim 18 is confusing. How can the "forensic authentication marker" be "a polymer having a forensic authentication marker"? It appears that the "forensic authentication marker" has two contradictory definitions in this claim.

It appears that claim 19 has the wrong dependency, since claim 16 does not recite any polymer, and therefore the limitation "the polymer" does not have an antecedent basis, unless the polymer is a tagged polymer of claim 1. However, it is not clear from the claim, if this is the tagged polymer. Claim 19 is further unclear as to what is meant by the limitation "wherein the polymer is miscible with polycarbonate". How one polymer can be "miscible" with another polymer? The term "miscible" is conventionally applied to solutions, while it does not appear that the solutions are recited in the claim.



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Clarification is requested. It is also unclear, as to how polycarbonate is related to the subject matter of the preceding claims.

From claims 20 and 22 it is not clear, which copolymers are recited in the claim. To the examiners understanding, e.g. "DMBPC" is an unconventional abbreviation of 1,1-bis(4-hydroxy-3-methyl phenyl) cyclohexane. Which copolymers the claims recite? Furthermore, it is not apparent as to which are the specific forensic authentication markers related to the compounds listed in claims 20 and 22.

In claim 28 it is not clear, what the number "10-18" might be.

Claim 33 is not clear in regards to performing the step of authentication of a tagged article. The examples in the specification comprise dissolving the material to analyze the polymer with NMR spectroscopy ("the forensic analytical technique"), which contradicts the subject matter of claim 33. According to claim 33 the article should not be destroyed in order to be authenticated, otherwise the article will not be authenticated as the "tagged article". It is also not clear, what does the step of "incorporating together a polymer and a compound comprising a forensic authentication marker" comprise? Is this a physical mixing of the powdered polymer and the compound? Is this something else? The language of the claim renders it unclear and indefinite.

Claims 36 and 38 recite a limitation "the substrate polymer", which does not have an antecedent basis. It is not apparent, as to which "substrate polymer" the claims recite.

The step of "incorporation" recited in claim 38 renders the claim unclear and indefinite in the same manner it was indicated for claim 33.

Claim 39 has the same flaws in its recitation as the preceding claims.

### ***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 1-8, 11-14 and 16-19** are rejected under 35 U.S.C. 102(b) as being anticipated by Livesay (US 1,487,967, IDS).

Livesay discloses a method for authentication that a test polymer is a tagged polymer, with a tagged polymer comprising anyone of polymers disclosed on pages 1 and 2, the tags comprising microparticles of a distinctive shape or size (detected by a dynamic response analytical technique, such as visible optics) and comprising specifically coded tagging elements (detected by forensic analytical technique, such as electron paramagnetic resonance spectroscopy, page 2, line 114). The microparticles do not affect any properties of the tagged polymer recited in claims 2-6. "Each tagging element should be incorporated in an amount of at least 0.1 percent of the total weight" (page 2, lines 89-90). The tagging material includes Si (see Table on page 3). Since the tagged polymer can be polyethylene, the forensic authentication marker includes the group consisting of  $(-\text{CH}_2-)_n$  groups, with  $n$  over 4.

11. **Claims 1-6, 16-19, 30-31, 33 and 35-39** are rejected under 35 U.S.C. 102(b) as being anticipated by Matsumoto et al. (SPIE, 1998).

Matsumoto teaches "a clone preventative technique which features magnetic micro-fibers and cryptography", comprising incorporating micro-fibers containing iron oxide particles (forensic authentication marker), which can be detected with micro-fibers detector (forensic analytical technique), into polymer substrate such as polycarbonate (see page 277), and using the digital signature (a physical dynamic response authentication marker) utilizing asymmetric cryptography (dynamic response analytical technique) (see page 282). The markers do not alter the substrate parameters recited in claims 2-6. Micro-fibers comprise such polymeric fibers as PET, acrylic fibers, etc., comprising the functional groups recited in claims 16-18 (page 277). They are miscible with polycarbonate, which is used as one of the substrates (see above). The method is applied to molded articles such as plastic cards.

#### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. **Claims 1-8, 11-20, 22 and 25-39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Cyr et al. (US 6,099,930, IDS) in view of Davis et al. (6,001,953, IDS) and e.g. Buess et al. (US 6,411,208).

Cyr teaches “methods for marking digital compact discs as a means to determine its authenticity”, wherein the methods comprise incorporating a near infrared fluorophore into the CD by “coating, admixing, blending or copolymerization and in an amount to impart a detectable fluorescence from the fluorophore when exposed to electromagnetic radiation” (Abstract). Fluorophore is a dynamic response authentication marker. “A preferred material for use as a substrate is a thermoplastic, desirably, polycarbonate having the near infrared fluorophore incorporated therein. The near infrared fluorophore composition can be copolymerized with the polycarbonate, admixed into the polycarbonate, or coated onto the surface of the polycarbonate. If the latter application methodology is chosen and the near infrared fluorophore is coated onto the substrate

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layer 12, it is preferable that the near infrared fluorophore be located adjacent to the second surface 15 of the substrate 12" (col. 3, lines 49-59).

Cyr does not specifically teach a different forensic authentication marker and using a different analytical technique for further authentication.

Davis discloses various compositions used for manufacturing optical articles based on polycarbonates, including DMBPC (col. 21, Example 8). Since the content of such compositions is optimized for obtaining the best properties required for specific applications of CD and therefore the compositions are specific, it would have been obvious for any person of ordinary skill in the art at the time the invention was made to use the composition of the articles as an authentication signature; it is especially true, since such analytical techniques as NMR or NQR are well known for obtaining authentication signatures, as disclosed e.g. by Buess et al.

Therefore, it would have been obvious for a person of ordinary skill in the art to use two authentication techniques for such molded articles as CDs - the one based on fluorescence detection of fluorescence label incorporated into the CD polymer, as taught by Cyr, and the second based on the specific composition of the CD material disclosed by Davis, which can be obtained by analytical techniques well known for providing authentication signatures of the materials, such as NMR, EPR, etc., as indicated by Buess, because this enforces authentication capabilities and enhances prevention of forgery or counterfeiting. It would have been obvious for any person of ordinary skill in the art to optimize the amount of the markers in order to make them detectable (depending in the sensitivity of the analytical technique) and, on the other hand, not interfering with the substrate.

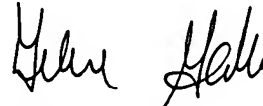
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

9/3/2007

  
**YELENA GAKH**  
**PRIMARY EXAMINER**